健康促進與衛生教育學報
第60期，頁41-73，2025年6月
Journal of Health Promotion and Health Education
No. 60, pp. 41-73, June 2025

Does Attitude to Food Label Matter and What Are Its Effects on the Anthropometric Measures of the Working Class in a Developing Economy?

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Abstract

Objectives: Food labels supplies information that aid consumers in building a well-balanced diet and avoiding risks that may be connected with inappropriate nutrition consumption of foods. Owing to increasing diet-related public health problems, food labeling has been considered very important, mainly because it can provide consumers with information that can be used to make informed and healthier food choices. Furthermore, there is paucity of information on attitudes of consumers to food label as well as its effect on nutritional outcomes in Nigeria. Thus, consumers' behavior towards food labels and its effect on the health status of University of Ibadan staff was investigated.

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Manuscript received: January 6, 2025; Revised: March 17, 2025; Accepted: March 24, 2025
DOI: 10.7022/JHPHE.202506_(60).0002

Methods: A multi-stage sampling technique was employed in selecting 304 staffers of the University of Ibadan. Data were analyzed using descriptive statistics, Body Mass Index (BMI) and ordered logit regression model.

Results: About two-thirds (67.76%) of the respondents had normal weight, while 22.7%, 6.91% and 2.63% were overweight, obese and underweight, respectively. The majority of the consumers (92%) read the basic information like date of production and expiry date, which were considered as the most important information on the food label of a food bought for the first time. The probability of being overweight and obese increased with age but declined with being a male and good attitude to food labels.

Conclusion: This study finds that age, gender, and attitude toward food labels significantly influence BMI among Nigerian university staff. Overweight and obesity is more prominent among female workers with poor attitude towards food labels than among their male counterparts. While most of the respondents check expiration dates, few consider nutritional details. Public health programs should enhance food label literacy, particularly for women and older adults, to promote informed food choices and reduce obesity risks. Stronger regulations and awareness campaigns are needed to maximize the benefits of food labels for healthier diets and improved well-being.

Key words: body mass index, consumers' attitude, label information, Nigeria, workers

Introduction

The increasing global health awareness has made food labels a critical means for disseminating nutritional information and health claims, profoundly influencing consumers' purchasing decisions (Wang, 2024). Food labels are marketing tool which may influence consumers' perception of the food quality and, in turn, their dietary choice (Martini & Menozzi, 2021). Consequently, information provided on food labels can influence consumer behaviour and can assist them in making informed decisions on healthier choices that can contribute to disease prevention and public health (Chen & Antonelli, 2020; Perumal et al., 2023). A food label is any written, stenciled, marked, embossed, printed, or graphic tag, brand, mark, pictorial or other descriptive matter, attached to a container of food for the purpose of promoting its sale (Hawkes & WHO, 2004). The aim of food label is to provide consumers with information that potentially influences their purchasing decisions, thus preventing poor dietary lifestyles and reducing risk of non-communicable diseases (Priya and Alur, 2023). Food label information should support consumers in building a well-balanced diet and in avoiding risks that may be connected with consumption of foods containing allergens (Michal et al., 2018). They also provide information about the composition and nature of products to avoid confusion and to protect them against misuses, risks and abuses (Nelene, 2016). However, inadequate use of food labels can lead to poor dietary habits because most packaged foods are high in saturated fat, salt and sugar which are not healthy (Zainol et al., 2014). Some of the risks associated with poor diet are high blood pressure, high body mass index, high cholesterol, high blood glucose, low food and vegetable intake. Consequently, food label is very useful for people who are on special diets (e.g. people suffering from diabetes or high blood lipid) to select suitable foods for

their health conditions.

Furthermore, food label informs the public about healthy foods and protects the consumer from unsafe foods (Ljubi i et al., 2022). Consumers often use food labels to find information such as the ingredient list, expiration date, nutrition, country of origin, serving size and statements about health benefits to help them make their purchasing decisions (Zafar et al., 2022). Food label information therefore supports consumers in building a well-balanced diet and in avoiding risks that may be connected with consumption of foods containing allergens (Michal et al., 2018). However, poor knowledge, attitude and use of food label information could result in many other negative effects on consumers including expired pre-packaged food products or large quantities of foods which have a very short shelf-life leading to wastage or frequent consumption of high calorie food (Mehanna et al., 2024). Food choices are therefore prejudiced if consumers are unable to understand label information (Jacobs et al. 2010). Thus, understanding of food labelling among consumers are necessary to ensure food safety (Melesse, 2019). However, good nutritional knowledge is essential for consumers to properly understand, interpret and act on food label information.

With a declining educational level from 68.11% in 2010 to 52.7% in 2018 (World Bank, 2024), the general educational level is low in Nigeria with many people not able to read, interpret or utilise information on food labels (Olatona, 2019; Adesina et al., 2022). The presence of ethno-cultural, demographic and socioeconomic diversity in Nigeria demands a unique context for research. Thus, understanding consumer's behavior towards food labeling has important implications on the health status of consumers. This contributes to the achievement of the twelfth of the Sustainable Development Goals which aims at sustainable consumption and production aims with less welfare gains from economic activities while increasing the quality of life. Consumer behavior is often affected by the type and quality of information made available to them.

Thus, food labels are pivotal to consumer knowledge enrichment. In addition, educational level, age, income, working status, and number of preschool children are directly related to consumers' use of food labels (Falola 2014; Simmaky et al., 2015; Damilola et al., 2019). However, consumers who place more importance on price tags are less likely to use nutritional labels (Grunert & Wills, 2007). Other factors have also been found to affect nutrition label use include health and nutrition claim use, being skeptical toward claims, and attitude of consumers toward nutritional content (Wallis & Arrowsmith., 2024).

Previous studies on food labeling in Nigeria are limited, focusing on assessment of knowledge, perception and utilization of as well as the willingness to pay for food labels (Anyam et al., 2013; Falola, 2014; Egbekunle, 2017; Danilola et al., 2019; Olatona et al., 2019; Asouzu and Iheme, 2020; Adesina et al., 2022). However, there is a paucity of information on attitudinal effect of consumers to food label on nutritional outcome in Nigeria, especially among the working class. The working class are expected to be conscious consumers, who pay more attention to information displayed on the label (Galati et al., 2019). Attitude of University of Ibadan staff towards food labels and the effect on their health outcomes were therefore investigated.

Methodology

Participants and Sampling

Primary data for the study was collected with the use of a questionnaire to collect information from 320 staffers of University of Ibadan in 2020. The selection was made utilizing a multi-stage sampling procedure in which random sampling was used in the first stage to select thirty percent each, of the thirteen faculties, and the eighteen units under the non-academics in the university, which

gives us a total of approximately four faculties, and five non-academic units respectively. Thirty percent of faculties and non-academic units were chosen due to lack of finance to cover more faculties. For adequate representation of departments in each faculty, 50 percent of departments in the selected faculties were randomly selected at the second stage. A faculty is expected to have a minimum of four departments. Questionnaires were administered to 30 percent of the academic staffs, and 50 percent of the non-academic staffs in each of the departments. This is because there were more academic staff than non-academic staff in each department. Similarly, thirty percent of non-academic staff from five units were randomly selected. However, the non-academic units consist of senior staffs and junior staffs and they were sampled in the ratio 3:1 for equal representation. All academic workers are senior members of staff. A total of 304 out of 320 respondents with consistent responses were used for the analyses with an attrition rate of 5.0%. A major limitation to the study was lack of access to research grants to expand the scope of the study to all the faculties and departments within the university walls.

Measurement/Instruments

Individual respondents were selected and data was collected by the well-structured questionnaire developed based on the objectives of the study administered to the individual respondents. Information on age, sex, household size, level of education, monthly income and number of pre-school children. Qualitative information on food labels were collected including frequency of use of food labels, nutrition information, certification, country of origin, packaging materials, expiry date and instruction for use. Likert scale (Likert, 1932) was used to measure consumers' attitude to food label. Body Mass Index (BMI) is a valuable tool for macro-nutritional status, whether under-nutrition, normal range, or overnutrition (Yu et al., 2024). It is also useful in population surveys and

primary healthcare screening (Wu et al., 2024; Sweatt et al., 2024). The BMI was used to categorise the workers into four categories of health statuses.

Analytical Tools

Data were analysed using descriptive statistics, and Ordered Logit Regression (McCullagh, 1980). Since BMI is an ordinal categorical variable (underweight, normal weight, overweight, obese), an Ordered Logit Regression model was chosen to account for the ranked nature of the outcome variable.The model was specified as:

$$Y* = X^T\beta + \varepsilon$$

Where;

Y* = exact but unobserved dependent variable (Health status of the respondent)

X = vector of the independent variables

Ɛ = error term

B = regression coefficients which we want to estimate

Since Y* cannot be observed, we instead observe the categories of response to health status (underweight, normal weight, overweight and obese)

$$\begin{Bmatrix} 0 & if & Y* \leq \mu 1 \\ 1 & if & \mu 1 < Y* \leq \mu 2 \\ 2 & if & \mu 2 < Y* \mu 3 \\ 3 & if & \mu 3 < Y* \mu 4 \end{Bmatrix}$$

Where the parameters:

μ = are the externally imposed endpoints of the observable categories. Then the ordered logit technique used the observations on y, which are a form of censored data on Y*, to fit the parameter vector β.

Model specification for the ordered logit regression model (effect of consumers' behaviour towards food labels on their health status) is given as:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots + \beta_n X_n + \varepsilon$$

Y_i = health status (Y_1–Y_4)

Where the response variable has four categories:

0 = underweight (BMI <18.5)

1 = normal weight (18.5≤BMI≤24.9)

2 = overweight (25≤BMI≤29.9)

3 = obese (BMI >30)

X_i is a vector of explanatory variables (Description in Appendix I); and ε is the error term. data The cut points indicate where the latent variables (health status) are the cut-offs or thresholds between the groups. Stata17 statistical software was used to analyse the data.

Results

Profiling Health Status of Workers by Demographic Characteristics

About two-thirds (67.8%) of the workers had normal weight (Table 1), which is consistent with the findings of Gaia et al., (2016) that the majority (61.8%) of the respondents had normal weight. Also, a lower percentage, (2.6%) of the population is underweight. Higher proportions of obese (61.9%) and overweight (76.8%) workers were female, higher proportions of workers with normal weight (53.4%) and those that were underweight (75.0%) were male. The highest proportion (39.5%) of the respondents were between 36-45 years of age, while 2.6% were between age 18-25 years. Among respondents who were

in the age bracket of 18-25 years of age, 4.8% were obese and 3.4% respondent had normal weight. Among respondents who were in the age bracket of 26-35 years of age, majority, (20.9%) had normal weight while 9.5% were obese. Among respondents who were in the age bracket of 36-45 years of age, majority (40.8%) had normal weight while 12.50% were underweight. Among respondents who were in the age bracket of 46-55 years of age, majority (25.2%) had normal weight while 12.5% were underweight. Among respondents who were above 55 years of age, majority (7.7%) had normal weight, while 4.8% were obese. A typical overweight worker was the oldest (46.0 ± 8.52 years) with the highest mean monthly income (₦ 92515.66 ± 31110.76) among the respondents, while a typical underweight worker was the youngest (33.6 ± 5.88 years) with the least mean monthly income (₦ 84,243.45 ± 41776.22) (Appendix II).

Furthermore, most (84.5%) of the respondents were married, while 13.8% respondents were single and (1.6%) of the others were divorced. A higher percentage of workers that were obese (85.7%), overweight (89.9%) and had normal weight (84.0%) were married, while a half (50.0%) of underweight workers were married. Moreover, the highest proportion (57.1%) of the respondents who are obese have household size of between 4 and 6. Among respondents who are overweight, majority (66.7%) have household size of between 4 and 6 (Table 2). Among respondents who have normal weight, majority, (71.4%) also falls between those with four to six household members. About a half of underweight workers had one to three household members. In addition, two-thirds of the respondents (66.7%) who had no preschool children were obese while a third (33.3%) of the respondents who were obese had one or two preschool children. However, about 56.5% of respondents who had no preschool children were overweight and 39.1% of respondents who had between one and two preschool children were overweight.

Table 1
Health Status Profile of the Workers

Socio-economic characteristics	Obese	Overweight	Normal weight	Under weight	Total
Sex					
Male	8 (38.10)	16 (23.19)	110 (53.40)	6 (75.00)	140 (46.05)
Female	13 (61.90)	53 (76.81)	96 (46.60)	2 (25.00)	164 (53.95)
Total	21 (100.00)	69 (100.00)	206 (100.00)	8 (100.00)	304 (100.00)
Marital status					
Single	3 (14.29)	6 (8.70)	29 (14.08)	4 (50.00)	42 (13.82)
Married	18 (85.71)	62 (89.86)	173 (83.98)	4 (50.00)	257 (84.54)
Divorced	0 (0.00)	1 (1.45)	4 (1.94)	0 (0.00)	5 (1.64)
Total	21 (100.00)	69 (100.00)	206 (100.00)	8 (100.00)	304 (100.00)
Age					
18-25	1 (4.76)	0 (0.00)	7 (3.40)	0 (0.00)	8 (2.63)
26-35	2 (9.52)	9 (13.04)	43 (20.87)	6 (75)	60 (19.74)
36-45	10 (47.62)	25 (36.23)	84 (40.78)	1 (12.50)	120 (39.47)
46-55	7 (33.33)	29 (42.03)	52 (25.24)	1 (12.50)	89 (29.28)
>55	1 (4.76)	6 (8.70)	20 (9.71)	0 (0.00)	27 (8.88)
Total	21 (100.00)	69 (100.00)	206 (100.00)	8 (100.00)	304 (100.00)
Household size					
1-3	5 (23.81)	14 (20.29)	49 (23.79)	4 (50.00)	72 (23.68)
4-6	12 (57.14)	46 (66.67)	147 (71.36)	3 (37.50)	208 (68.42)
7-8	4 (19.05)	9 (13.04)	10 (4.85)	1 (12.50)	24 (7.89)
Total	21 (100.00)	69 (100.00)	206 (100.00)	8 (100.00)	304 (100.00)
Number of pre-school children					
0	14 (66.67)	39 (56.52)	125 (60.68)	4 (50.00)	182 (59.87)
1-2	7 (33.33)	27 (39.13)	75 (36.41)	4 (50.00)	113 (37.17)
3-4	0 (0.00)	3 (4.35)	6 (2.91)	0 (0.00)	9 (2.96)
Total	21(100.00)	69 (100.00)	206 (100.00)	8 (100.00)	304 (100.00)
Career status					
Non- academic staff	156 (75.73)	16 (76.19)	46 (66.67)	6 (75.00)	224 (73.68)
Academic staff	50 (24.27)	5 (23.81)	23 (33.33)	2 (25.00)	80 (26.32)
Total	21 (100.00)	69 (100.00)	206 (100.00)	8 (100.00)	304 (100.00)

Figures in parentheses are percentages

Health Status of the Workers

The majority (77.0%) of the workers never experienced hypertension, while 23.0% had hypertension (Table 2). 17.4% of the respondents had high cholesterol and 82.6% of the respondents never had high cholesterol. 14.1% of the respondents had diabetes while 85.86% of the respondents never had diabetes. Majority (97.4%) of the respondents never had heart failure while 2.6% of the respondents had heart failure. 96.7% of the respondents never experienced stroke while 3.3% of the respondents had experienced stroke. This reveals that a higher population of respondents have good health characteristics which' the findings of Wahab (2018) in which majority (71%) of the number of shoppers have good health condition. Out of 21 obese respondents, a higher proportion (23.8%) had hypertension, 14.3% had high cholesterol and diabetes, and the least which was 4.8% had heart failure. Among 69 respondents who were overweight, majority 924.6%) had hypertension, 23.2% had high cholesterol, 13.0% had diabetes and 1.5% had stroke. Among the normal weight category, 22.3% had hypertension, 16.5% had high cholesterol, 15.05% had diabetes, 3.4% had heart failure and 4.37% had stroke. A quarter (25.05%) of the underweight workers had hypertension.

Table 2

Profile of Workers' Health Status by their Health Challenges

Health challenges	**Obese**	**Over weight**	**Normal weight**	**Under weight**	**Total**
Hypertension					
Yes	5 (23.81)	17 (24.64)	46 (22.33)	2 (25.00)	70 (23.03)
No	16 (76.19)	52 (75.36)	160 (77.67)	6 (75.00)	234 (76.97)
Total	21 (100.00)	69 (100.00)	206 (100.00)	8 (100.00)	304 (100.00)

(continued)

Table 2. (continued)

Health challenges	Obese	Over weight	Normal weight	Under weight	Total
High cholesterol					
Yes	3 (14.29)	16 (23.19)	34 (16.50)	0 (0.00)	53 (17.43)
No	18 (85.71)	53 (76.81)	172 (83.50)	8 (100.00)	251 (82.57)
Total	21 (100.00)	69 (100.00)	206 (100.00)	8 (100.00)	304 (100.00)
Diabetes					
Yes	3 (14.29)	9 (13.04)	31 (15.05)	0 (0.00)	43 (14.14)
No	18 (85.71)	60 (86.96)	175 (84.95)	8 (100.00)	261 (85.86)
Total	21 (100.00)	69 (100.00)	206 (100.00)	8 (100.00)	304 (100.00)
Heart failure					
Yes	1 (4.76)	0 (0.00)	7 (3.40)	0 (0.00)	8 (2.63)
No	20 (95.24)	69 (100)	199 (96.60)	8 (100.00)	296 (97.37)
Total	21 (100.00)	69 (100.00)	206 (100.00)	8 (100.00)	304 (100.00)
Stroke					
Yes	0 (0.00)	1 (1.45)	9 (4.37)	0 (0.00)	10 (3.29)
No	21 (100.00)	68 (98.55)	197 (95.63)	8 (100.00)	294 (96.71)
Total	21 (100.00)	69 (100.00)	206 (100.00)	8 (100.00)	304 (100.00)

Figures in parentheses are percentages

Consumers Attitude Towards Food Labels

The distribution of attitude from my sample of the population of University

of Ibadan staff towards food labels is shown in the table below using the Likert Scale. A larger proportion of the workers reported that food label always help in choosing healthier products always (63.7%) and that food label information can always help in product comparison (60.07%). However, the respondents posited that food label sometimes gives truthful information about nutritional content (51.0%), and information on food labels sometimes affect their food intake (44.08%) (Table 3). The consumers also posited that food label may change their buying decision sometimes. This is probable because consumers assumed they know the product they want to purchase to have reached minimum standard.

Table 3

Consumers' Attitude Towards Information on Labels

Information on labels	**Always**	**Sometimes**	**Rarely**	**Never**	**Weighted mean**	**Decision**	**Rank**
Food label information can affect my food intake	134 (44.08)	129 (42.43)	32 (10.53)	9 (2.96)	3.27	Sometimes	4th
Food label gives truthful information about nutritional content	155 (50.99)	131 (43.09)	16 (5.26)	2 (0.66)	3.44	Always	6th
Food label change my buying decision	96 (31.68)	165 (54.46)	35 (11.55)	8 (2.36)	3.15	Sometimes	5th
Food label information can help in product comparison	182 (60.07)	97 (32.01)	22 (6.93)	3 (0.99)	3.51	Always	2nd
Food label can help in choosing healthier products	193 (63.70)	87 (28.7)	20 (6.60)	4 (1.00)	3.54	Always	1st

Figures in parentheses are percentages

Consumers Attitude Towards Certifications on Food Labels

A higher proportion (58.6%) of the respondents posited that they always checked the National Agency for Food and Drug Administration and Control (NAFDAC) certification logo on food labels (Table 4). This was followed by logos of Standard Organisation of Nigeria (SON) and Nigerian Quality Mark on food labels, which were ranked as 2nd and 3rd, respectively. Although all products manufactured must be certified to Mandatory Conformity Assessment Programme (MANCAP) before being introduced to the market, it was the least certification logo that consumers looked out for.

Table 4

Consumers' Attitude Towards Certifications on Labels

Label Certification	Always	Sometimes	Rarely	Never	Mean Score	Weighted mean	Decision	Rank
MANCAP	58 (19.08)	96 (31.58)	108 (35.53)	42 (13.82)	3.44	1.56	Sometimes	4th
SON	78 (25.66)	107 (35.20)	106 (34.87)	13 (4.28)	3.18	1.82	Sometimes	2nd
NIGERIAN QUALITY MARK	70 (23.03)	113 (37.17)	95 (31.25)	26 (8.55)	3.25	1.75	Sometimes	3rd
NAFDAC	178 (58.55)	96 (31.58)	26 (8.55)	4 (1.32)	1.52	3.47	Always	1st

Figures in parentheses are percentages

Consumers Attitude Towards Information on Food Labels

According to this ranking, the most important piece of information on a label is the expiry date (91.12%) (Table 5). This is consistent with the findings of Wahab (2018) found out that majority of the consumers (85.5%) look to see the information about expiry dates; followed by food price (69%).

In terms of ranking, the date of expiry was followed by the price of product, date of production, sugar, cholesterol, list of ingredients, and packaging. The least important pieces of labeling information, according to consumers, were the size of serving, country of production, producers, fat, energy, sodium and carbohydrate.

Table 5

Consumers' Attitude Towards Type of Food Information

Information on Food Label	**Always**	**Sometimes**	**Rarely**	**Never**	**Weighted mean**	**Decision**	**Rank**
Size of serving	74 (24.34)	96 (31.58)	125 (41.12)	9 (2.96)	1.77	Rarely	15th
Price	261 (85.86)	35 (11.51)	7 (2.30)	1 (0.33)	3.83	Always	2nd
Expiry date	277 (91.12)	26 (8.55)	1 (0.33)	-	3.91	Always	1st
Date of Production	155 (51.16)	114 (37.62)	32 (10.56)	2 (0.66)	3.38	Sometimes	3rd
Ingredients	110 (36.30)	141 (46.53)	51 (16.83)	1 (0.33)	3.18	Sometimes	6th
Packaging	105 (34.54)	148 (48.68)	47 (15.46)	4 (1.32)	3.16	Sometimes	7th
Producers	68 (22.37)	134 (44.08)	94 (30.92)	8 (2.63)	2.86	Sometimes	11th
Country of production	64 (21.05)	125 (41.12)	105 (34.54)	10 (3.29)	2.80	Sometimes	13th
Instruction for use	106 (34.87)	103 (33.88)	85 (27.96)	10 (3.29)	3.04	Sometimes	9th
Energy	80 (26.32)	117 (38.49)	98 (32.24)	9 (2.96)	2.88	Sometimes	10th

(continued)

Table 5. (continued)

Information on Food Label	Always	Sometimes	Rarely	Never	Weighted mean	Decision	Rank
Fat	114 (37.50)	120 (39.47)	61 (20.07)	9 (2.96)	3.11	Sometimes	8th
Cholesterol	138 (45.39)	108 (35.53)	53 (17.43)	5 (1.64)	3.25	Sometimes	5th
Sodium	67 (22.04)	109 (35.86)	108 (35.53)	20 (6.58)	2.73	Sometimes	14th
Carbohydrate	79 (25.99)	108 (35.53)	99 (32.57)	18 (5.92)	2.82	Sometimes	12th
Sugar	131 (43.09)	129 (42.43)	41 (13.49)	3 (0.99)	3.28	Sometimes	4th

Figures in parentheses are percentages

Consumer's Attitude Towards Use of Information on Labeled Food Products

The majority of the respondents always checked labels on canned products, beverages and juices among all other products mentioned (Table 6). This may be because these products are assumed to always contain available nutritional information written on them so most consumers do well to check. And also, consumers always checked labels on these products to avoid buying expired ones which can be very harmful to their health. The least ranked products were junks and condiments which consumers rarely consult labels for.

Table 6

Consumers' Attitude Towards Use of Information on Different Food Products

Food Products	Always	Sometimes	Rarely	Never	Weighted mean score	Decision	Rank
Junk	48 (15.84)	110 (36.30)	101 (33.33)	44 (14.52)	2.53	Sometimes	8th
Staple foods	59 (19.41)	106 (34.87)	102 (33.55)	37 (12.17)	2.62	Sometimes	6th
Pasta	69 (22.70)	122 (40.13)	84 (27.63)	29 (9.54)	2.76	Sometimes	4th
Beverages	136 (44.74)	150 (49.34)	13 (4.28)	5 (1.64)	3.37	Sometimes	1st
Juices	145 (47.70)	114 (37.50)	38 (12.50)	7 (2.30)	3.31	Sometimes	3nd
Canned products	157 (51.64)	110 (36.18)	30 (9.87)	7 (2.30)	3.37	Sometimes	1st
Iced dairy products	74 (24.34)	95 (31.25)	75 (24.67)	60 (19.74)	2.60	Sometimes	7th
Packaged fruits and vegetables	76 (25.00)	102 (33.55)	94 (30.92)	32 (10.53)	2.73	Sometimes	5th
Condiments	51 (16.78)	80 (26.32)	99 (32.57)	74 (24.34)	2.36	Rarely	9th

Figures in parentheses are percentages

Effects of Consumer's Behavior Towards Food Labels on Their Health Status

The result of the analysis revealed that the cut points <8.3175 (Table 7) is the intercept point for respondents that are underweight. The cut points indicate the boundary and mark the differences between consumers/respondents that are under weight, normally weighted, overweight, and obese. Thus, from the result of

the analysis, plugging in the coefficient of the significant variables into the model will reveal the health status of the respondents through their BMI, and inform us if they are underweight, normally weighted, overweight, or obese. Thus, given the significant variables gender, age squared, and attitude to food labels, and the model results in values between 0 and 8.3175 for each individual respondent, such person is underweight. Similarly, values that are greater than 8.3175, and less than or equal to 8.6632 show that the respondent has normal weight, and values hitherto 11.3374 indicate respondents who are overweight. Values greater than 11.3374 shows that the respondent is obese all of this given the significant variables, *ceteris paribus*.

Furthermore, age squared had a negative relationship with health status of the consumers. This implies that a unit increase in age squared leads to 0.0007 increase in being underweight, 0.0001 decrease in being normal weight, 0.0005 decrease in being overweight and 0.0001 decrease in being obese. Being a male consumer leads to 0.1921 increase in being underweight, 0.0255 decrease in being normal weight, 0.1445 decrease in being overweight and 0.0220 decrease in being obese. This is because most male consumers took checking of food labels very serious which then has lower tendency of consuming junks hence a lower tendency of being overweight or obese. Moreover, improved attitude towards food label would reduce the likelihood of being overweight and obese. Contrary to expectation, it also reduced the likelihood of having normal weight but increased the likelihood of being underweight.

Table 7

Relationship Between Consumers' Attitude to Food Label and Their Health Status

Variables	Coefficient	Marginal effect (under weight)	Marginal effect (normal weight)	Marginal effect (over weight)	Marginal effect (obese)
Age	0.3319** (0.1604)	-0.0635** (0.0298)	0.0075** (0.0039)	0.0480** (0.0228)	0.0079** (0.0047)
Age squared	-0.0034** (0.0017)	0.0007 (0.0032)	-0.0001 (0.0000)	-0.0005*** (0.0002)	-0.0001 (0.0000)
Being a Male	-1.0101*** (0.2936)	0.1921*** (0.0522)	-0.0255 (0.0972)	-0.1445*** (0.0403)	-0.0220*** (0.0097)
Family size	0.1227 (0.1281)	-0.0235 (0.0243)	0.0029 (0.0030)	0.0178 (0.0184)	0.0029 (0.0032)
Preschool children	0.1665 (0.1558)	-0.0318 (0.0296)	0.0038 (0.0036)	0.0241 (0.0225)	0.0039 (0.0039)
Marital status	-0.1859 (0.5992)	0.0356 (0.1146)	-0.0042 (0.0137)	-0.0269 (0.0867)	-0.0044 (0.0143)
Occupation category	0.3135 (0.3322)	-0.0614 (0.0663)	0.0070 (0.0074)	0.0466 (0.0504)	0.0078 (0.0092)
Years of education	0.0434 (0.0771)	-0.0083 (0.0147)	0.0009 (0.0018)	0.0063 (0.0111)	0.0010 (0.0019)
Per capita income	0.2022 (0.2485)	-0.0387 (0.0473)	0.0046 (0.0057)	0.0293 (0.0359)	0.0048 (0.0062)

(continued)

Table 7. (continued)

Variables	Coefficient	Marginal effect (under weight)	Marginal effect (normal weight)	Marginal effect (over weight)	Marginal effect (obese)
Attitude to food labels	-1.0712*** (0.3806)	0.2048*** (0.0694)	-0.0243*** (0.0099)	-0.1550*** (0.0534)	-0.0254** (0.0129)
/cut 1	8.3175 (4.6026)				
/cut 2	8.6632 (4.6056)				
/cut 3	11.3374 (4.6290)				
Number of obs = 276					
Prob > chi2 = 0.0009					
Log likelihood = -221.6657					

*,**, *** represents levels of significance at 10%, 5% and 1%, respectively

Figures in parentheses are standard errors

Discussion

Low monthly income might be responsible for poor attitude to food labels and consequently result into poor health outcomes. This is because consumers with a higher level of income tend to use labels more frequently and effectively, low-income people have less nutrition knowledge and find it difficult to understand or use nutrition labels for food selection (Krishnaraj et al., 2024; Mehanna et al., 2024). Similarly, Asiseh & Yao (2016) established that additional income could subject middle income class to higher BMI and higher likelihood of being overweight or obese than for the rich. The mean household size also ranged from four (underweight) to five (obese) and they all had at least one pre-school child. A higher proportion of respondents with no preschool children were either obese or overweight. This is because small families have higher per capita expenditure, can afford junk foods and are expected to be at higher risk for overweight and obesity (Datar, 2017; Dasgupta & Solomon, 2018). Thus, additional household members might lead to poor attitude to food labels and food choices and consequently poor health status as they won't be able to afford healthy food for everyone (Shireen et al., 2022). Although most of the respondents with normal weight were between the age bracket of 36 and 45 years, hypertension was the prevalent health challenge. This might have a positive influence on the consumers attitude to food labels. The majority of the respondents were more informed about NAFDAC certification logo compared to the others, which suggests NAFDAC is the most known and trustworthy food certification authority in Nigeria. The most important piece of information on a label are the price and the expiry date. The result buttressed the findings of Roos et al. (2010) and Kumar & Kapoor (2017) that almost all consumers always checked price and date on food products they buy. It is also consistent with the findings of Toma et al. (2020) that checking of date labels are the main predictors

of consumers' purchasing behavior. Overweight and obesity are often associated with increased mortality and other adverse outcomes in adult population (Woo, 2016). Thus, there is a higher tendency of being underweight as the consumer's age, which is consistent with the lifecycle hypothesis, because older people tend to consume fewer junks which may increase their BMI (Jura & Kozak, 2016). In addition, there were more obese and overweight female workers but more male workers with normal weight and underweight among the respondents. Being a male worker also reduced the likelihood of being overweight and obese. Although women are more prone to check and use food label components more often and thoroughly than men, they are more likely to be overweight or obese than their male counterparts (Bellikci-Koyu et al., 2024; Almughamisi & Almask, 2024).

Furthermore, the findings established that the nutritional information on a food label has a strong influence on respondents' purchasing decisions of healthier products and that food label information always help in product comparison before purchase. This suggests that food nutrition labels have a profound impact on consumer purchasing decisions (Wang, 2024; Adesina et al. (2022). Moreover, per capita income did not have a significant effect on health outcomes, which is similar to the findings of Song (2019). Thus, improved attitude of obese and overweight workers towards food label would improve their health status. This suggests that increased awareness about use of food label is a viable public health tool to reduce overweight and obesity among the working class. However, this is contrary to the finding of Gordon (2012) that individuals who used food labels had a higher body mass index (BMI) and were more likely to be obese than those who did not use it. Improved attitudes toward food labels are linked to lower overweight and obesity rates but also increase the likelihood of being underweight (Mehanna et al., 2024). However, individuals who actively read food labels may intentionally restrict their calorie intake, increasing their

risk of being underweight. This suggest that knowledge of food label, though necessary, may not be sufficient to provoke healthy eating behavioral change (Bryla, 2020). Although individuals with normal BMI may have positive attitude towards food label, they may not consistently use nutritional labels to make healthy decisions in order to keep a lean body frame.

Conclusion

The study shows that food labels significantly affect general public behavior. To this end, the awareness of label usefulness among all the consumers' categories should be raised, especially, among the female workers. Up-stream efforts should be done first of all on the aged, to improve general public basic knowledge about nutrition and the relationship between diet and health status, in order to make older consumers more concerned of changing eating habits. There should be adequate awareness about all other certifications on food labels and also, strict adherence to check of certifications by all consumers during the purchase of products. Furthermore, the majority of the respondents affirmed that food labels helped them in the selection of healthy foods. However, it was noticed that food labels were not used completely consciously by most consumers. It is therefore suggested that public health policy makers should strongly encourage the use of food labels, emphasizing their informative and protective role. These findings underscore the need for government-led initiatives to enhance food label education, particularly targeting the working class and female consumers.

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Appendices

Appendix I

Variables	Description	Type of data
Dependent Variable		
Health status	0 = underweight (BMI <18.5)	Ordered
	1 = normal weight (18.5<BMI<24.9)	
	2 = overweight (25<BMI<29.9)	
	3= obese (BMI >30)	
Independent Variables		
Age	Age of worker in years	Continuous
Age squared	Age of worker in years squared	Continuous
Being a Male	1 if male; 0 if otherwise	Binary
Family size	Number of household members	Continuous
Preschool children	Number of children less than 5years old	Continuous
Marital status	1 if married; 0 if otherwise	Binary
Occupation category	1 if academic; 0 if otherwise	Binary
Years of education	Years of formal education (in years)	Continuous
Per capita income	Income divided by weighted household size	Continuous
Attitude to food labels	Mean score (Likert scale) of attitude of workers to food labels	Continuous

Appendix II

Mean and Standard Deviation of Workers' Continuous Variables by Health Status

Variables	Obese	Overweight	Normal weight	Underweight
Age (in years)	42.85	46.00	42.87	33.63
	(8.59)	(8.52)	(9.72)	(5.88)
Monthly income (₦)	76,543.88	92,515.66	87,389.1	84,243.45
	(34766.65)	(31110.76)	(33454.87)	(41776.22)
Household size	4.57	4.52	4.26	3.875
	(2.01)	(1.69)	(1.47)	(1.81)
Number of pre-school children	0.59	0.73	0.64	0.71
	(0.79)	(0.89)	(0.87)	(0.76)

Figures in parentheses are standard deviations

₦ is the symbol of the Nigerian currency.

發展中經濟體工人階級對食品標示的消費者行為及其對健康狀況的影響

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摘要

目標：食品標籤提供的資訊可幫助消費者建立均衡飲食並避免可能與食品營養攝取不當相關的風險。由於與飲食相關的公共衛生問題日益增多，食品標籤被認為非常重要，主要是因為它可以為消費者提供信息，用於做出明智和更健康的食品選擇。本研究評估了消費者對食品標籤的行為及其對伊巴丹大學教職員工健康狀況的影響。

方法：採用多階段抽樣技術抽取伊巴丹大學304位教職人員。使用描述性統計、身體質量指數（BMI）、四點李克特量表和序位邏輯迴歸模型對數據進行分析。

結果：約三分之二（67.76%）的受訪者體重正常。超重、肥胖和體重不足的比例分別為22.7%、6.91%和2.63%。大部分消費者（92%）在第一次購買食品時會閱讀生產日期、保質期等基本訊息，這些資訊被認為是食品標籤上最重要的資訊。超重和肥胖的可能性隨著年齡的增長而增加，但隨著男性身份和對食品標籤的態度而下降。

結論：這項研究發現，年齡、性別和對食品標籤的態度顯著影響奈及利亞大學教職員的身體質量指數。在對食品標籤態度較差的女性工作者中，超

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重和肥胖現像比男性工人更為突出。雖然很多人會檢查保質期，但很少人會考慮營養細節。公共衛生計劃應提高食品標籤知識，特別是針對婦女和老年人，以促進知情的食物選擇並降低肥胖風險。需要更強有力的監管和宣傳活動，以最大限度地發揮食品標籤的好處，促進更健康的飲食和改善福祉。

關鍵詞：工人、消費者態度、奈及利亞、標籤資訊、體重指數